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EXAMINER	
FETZNER, TIFFANY A	
ART UNIT	PAPER NUMBER
2859	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/707,433	PETERS, ROBERT D.	
	Examiner	Art Unit	
	Tiffany A. Fetzner	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/12/2003* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/22/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 12/22/2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement, and the initialed and dated IDS is attached to this office action.

Drawings

2. The drawings have been objected to by the Official Draftsperson, see the attached PTO 949 Form.

Claim objections

3. **Claims 2, 4, 7** are objected to because of the following informalities:

A) In **claim 2** line 1 after words "wherein the" **insert** "step" before the word "of" so that the claim is grammatically correct. Appropriate correction is required.

B) In **claim 4 remove** "cl081cl08". Appropriate correction is required.

C) In **claim 7**, the words "wherein at two sets of reference data and further comprising the steps of averaging the two sets of reference data to determine the table of correction values" does not make cohesive sense since "wherein at two sets of reference data" is grammatically awkward and the limitation of "averaging the two sets of reference data to determine the table of correction values" is a single step. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1-6, 8, 19-22** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Kuhara** US patent 4,859,946 issued August 22nd 1989.

6. With respect to **Claim 1**, **Kuhara** teaches and shows "A method comprising the steps of: acquiring MR data from multiple echoes in an echo train with a fast spin echo pulse sequence;" [See figures 3, 5, 6, 7, col. 1 line 36 through col. 3 line 43; col. 4 line 61 through col. 7 line 16]. **Kuhara** also teaches and shows "correcting for amplitude modulation effects" (i.e. EP1, EP2, EP3, ...EPN compared to the EP1', EP2', EP3', ...EPN' of **figures 6** and **7;** is an amplitude modulation effect; as is the Δt1, Δt2, Δt3, ... Δtn, compared to the ΔT1, ΔT2, ΔT3, ... ΔTn, of figures 6 and 7) in the fast spin echo pulse sequence after data acquisition". [See col. 2 line 66 through col. 7 line 16. The examiner notes that the difference between positive and negative amplitude values, of the echo peak positions is an amplitude modulation effect, and that the magnitude measurement of echo peak is equivalent to a measurement of the amplitude.]

7. With respect to **Claim 19**, **Kuhara** teaches and/or shows "A computer readable storage medium" [See **Kuhara** col. 5 lines 28-32 the memory array within computer 12] ""having a computer program to execute a fast Spin echo pulse sequence" (i.e. the ultra-fast EPI spin-echo sequence of figures 3, 5, 6, 7) "stored thereon and representing a set of instructions that when executed by a computer causes the computer to:" [See **Kuhara** figure 4 col. 4 line 7 through col. 6 line 18] "acquire non-phase encoded MR data;" [See **Kuhara** col. 4 line 67 through col. 7 line 16] "acquire phase encoded MR data from multiple echoes;" [See figures 1, 2] "and modify the phase encoded MR data by the non-phase encoded MR data to correct amplitude modulation between the multiple echoes" because **Kuhara,** teaches storing data of peak positions (i.e. the amplitudes of the detected echoes EP1, EP2, EP3, ...EPN with phase encoding; the amplitudes of the detected echoes EP1', EP2', EP3', ...EPN' without phase encoding from figure 5; and the differences in these peak positions ΔT1, ΔT2, ΔT3, ... ΔTn, that come from figures 6, 7, and 5**)** in a memory array of a computer 12. [See col. 5 line 29 through col. 7 line 16.] The Examiner notes that an array of stored data is the computer version of a data table, and therefore equivalent to "a table of amplitude modulation

correction values". Additionally, **Kuhara** teaches "applying at least a portion of the table to the acquired MR data." [See col. 5 line 29 through col. 7 line 16, because the ability to use feedback control, to correct the data, or not use data from the stored memory which would interfere with optimal image reconstruction is also taught by the **Kuhara** reference.]

8. With respect to **Claim 2**, **Kuhara** teaches and shows "the steps of: acquiring at least one set of reference MR data;" (i.e. the non phase-encoded data acquisition sequence used to correct errors in the imaging sequence with phase encoding.) [See figure 5 which shows an imaging sequence without the Ge phase encoding present, the lower half of the abstract, col. 3 lines 20=-43; col. 4 line 61 through col. 7 line 16]. **Kuhara** also teaches "determining a table of amplitude modulation correction values;" because **Kuhara** teaches storing data of peak positions (i.e. the amplitudes of the detected echoes EP1, EP2, EP3, ...EPN with phase encoding; the amplitudes of the detected echoes EP1', EP2', EP3', ...EPN' without phase encoding from figure 5; and the differences in these peak positions $\Delta T1$, $\Delta T2$, $\Delta T3$, ... ΔTn, that come from figures 6, 7, and 5**)** in a memory array of a computer 12. [See col. 5 line 29 through col. 7 line 16.] The Examiner notes that an array of stored data is the computer version of a data table, and therefore equivalent to "a table of amplitude modulation correction values". Additionally, **Kuhara** teaches "applying at least a portion of the table to the acquired MR data." [See col. 5 line 29 through col. 7 line 16, because the ability to use feedback control, to correct the data, or not use data from the stored memory which would interfere with optimal image reconstruction is also taught by the **Kuhara** reference.] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

9. With respect to **Claim 3**, **Kuhara** teaches "acquiring at least one set of reference MR data before" [See col. 4 line 66 through col. 7 line 16] "and after" [See the repeated test of col. 2 lines 56-61] "acquisition of the MR data" [See also figures 3, 5, 6, 7 which show the pulse timing diagrams for the acquisition of MRI data.] The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 3** and need not be reiterated.

10. With respect to **Claim 4**, **Kuhara** teaches "acquiring [~~cl081cl08~~] at least one set of reference MR data before acquisition of the MR data" [See col. 4 line 66 through col. 7 line 16] "and acquiring a second portion of the at least one set of reference MR data after" [See the repeated test of col. 2 lines 56-61] "acquisition of the MR data" [See also figures 3, 5, 6, 7 which show the pulse timing diagrams for the acquisition of MRI data.] The same reasons for rejection, that apply to **claims 1, 2, 3** also apply to **claim 4** and need not be reiterated.

11. With respect to **Claim 5**, **Kuhara** teaches and shows that "at least one set of reference MR data includes non-phase encoded data." (i.e. the non phase-encoded data acquisition sequence used to correct errors in the imaging sequence with phase encoding.) [See figure 5 which shows an imaging sequence without the Ge phase encoding present, the lower half of the abstract, col. 3 lines 20=-43; col. 4 line 61 through col. 7 line 16]. The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 5** and need not be reiterated.

12. With respect to **Claim 6**, **Kuhara** equation of col. 6 lines 48-53 and the teachings of col. 6 line 3 through col. 7 line 16, teaches "multiplying each k-space view" (i.e. each echo signal) "of the acquired MR data by a correction value" (i.e. $\Delta T1$ is the correction value) "in a corresponding ky location in the table;" [See the equation for determining each position ΔTi by the computer calculations on the stored array data. Col. 6 line 29 through col. 7 line 16] "and carrying out the steps of multiplying" [See the equation of col. 6 lines 48-53] "prior to transformation of the acquired MR data from k-space to image space" (i.e. this limitation is equivalent to performing the correction before reconstructing an image) [See col. 6 line 29 through col. 7 line 16, and <u>especially col. 6 lines 65-68</u>.] The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 6** and need not be reiterated.

13. With respect to **Claim 8**, and **corresponding claim 22** which respectively depend from **claims 1**, and **19 Kuhara** shows that **"**the at least one set of reference data" (i.e the non-phase encoded data) "represents a maximum achievable signal that the acquired phase encoded MR data can attain". [See figure 5 where the maximum

amplitude of the detected signals follows the t2* exponential curve in the absence of phase encoding. (i.e. without phase encoding the detected amplitude of the signals which occur when the read gradient alternates are hindered the least amount.] The same reasons for rejection, that apply to **claims 1, 2, 5, 19,** also apply to **claims 8, 22** and need not be reiterated.

14. With respect to **Claim 20**, **Kuhara** teaches and/or shows "acquire the non-phase encoded MR data from a series of discarded acquisitions played out **at least one of before and after** acquisition of the phase encoded MR data". [See **Kuhara** col. 1 line 35 through col. 7 line 31 where only non-interfering data, acquired before or after the non-phase encoded data is used in image reconstruction when a sampling wave includes a non-sharp waveform portion.] The same reasons for rejection, that apply to **claim 19** also apply to **claim 20** and need not be reiterated.

15. With respect to **Claim 21**, **Kuhara** teaches and/or shows "the phase encoded data includes one of 2D and 3D MR data" because 2d planar, slice images are produced. [See **Kuhara** col. 1 line 35 through col. 7 line 31] The same reasons for rejection, that apply to **claim 19** also apply to **claim 20** and need not be reiterated.

16. **Claims 1-5, 7, 8** and **23-26** are rejected under **35 U.S.C. 102(e)** as being anticipated by **Zhang** US patent application publication 2003/0109781 A1 published June 12th 2003, filed December 11th 2001.

17. With respect to **Claim 1**, **Zhang** teaches and shows "A method comprising the steps of: acquiring MR data from multiple echoes in an echo train with a fast spin echo pulse sequence;" [See figures 1 through 7b page 1 paragraph [0001] through page 4 paragraph [0051] **Zhang** also teaches and shows "correcting for amplitude modulation effects" (i.e. See figures 5m, 7a, and 7b in combination. Figure 5 shows multiple echoes with amplitude errors, figure 7a shows EPI data without preconditioning that sill has amplitude errors, figure 7b shows the result after preconditioning with the amplitudes aligned / corrected for locationally). page 1 paragraph [0001] through page 4 paragraph [0051] "in the fast spin echo pulse sequence after data acquisition". [See Figures 5, 7a, 7b in combination with figures 2, 3, 6a, and 6b which show fast EPI spin echo pulse

sequences. Any pulse sequence which is executed fast, and has a 90-degree pulse followed by a 180 degree pulse is a fast spin echo sequence. See also pages 1-2 paragraph [0009].]

18. With respect to **Claim 2**, **Zhang** teaches and shows "the steps of: acquiring at least one set of reference MR data;" (i.e. a non phase-encoded data acquisition sequence of figures 6a and 6b that is used to correct errors in the imaging sequence with phase encoding that is shown in figures 2 and 3.) [See page 2 paragraph [0024] through page 4 paragraph [0051]. **Zhang** also teaches "determining a table of amplitude modulation correction values;" [See paragraphs [0024] through paragraph [0051], especially paragraphs [0044] through [0045] where the correction factors Δ, δ, σ are calculated by a computer from the maximum amplitude of the echo peaks], because **Zhang** stores the correction parameters in the computer (i.e. in the computer's intrinsic memory) for use and modification of the next executed EPI pulse sequence. See also the **Zhang** abstract, page 1 paragraph [0001] through [0004]; and page 2 paragraph [0011] through [0023]]. The Examiner notes that figure 4 of **Zhang** also shows an array of k-space values and that the preconditioning correction data which include echo amplitude/peak data is acquired as an array of stored data within the computer which is a computer version of a data table, and therefore equivalent to "a table of amplitude modulation correction values".

19. Additionally, **Zhang** teaches "applying at least a portion of the pre-conditioning correction data to the acquired MR data." [See page 1 paragraph [0001] through page 4 claim 7, because **Zhang** teaches the ability to use a self-check preconditioning control, as a follow-up if needed to correct the data, and that one or more of the correction parameters may be applied. The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

20. With respect to **Claim 3**, **Zhang** teaches "acquiring at least one set of reference MR data before" [See the initial calculation of the preconditioning parameters without phase encoding] "and after" (i.e. the additional follow-up preconditioning self-check) "acquisition of the MR data" [See **Zhang** page 4 paragraph [0049] though [0051] See also the abstract and paragraph [0001] through paragraph [0051] in general.] The same

reasons for rejection, that apply to **claims 1, 2** also apply to **claim 3** and need not be reiterated.

21. With respect to **Claim 4**, **Zhang** teaches "acquiring [~~cl081cl08~~] at least one set of reference MR data before acquisition of the MR data" [See the initial calculation of the preconditioning parameters without phase encoding] "and acquiring a second portion of the at least one set of reference MR data after" (i.e. the additional follow-up preconditioning self-check) "acquisition of the MR data" [See **Zhang** page 4 paragraph [0049] though [0051] See also the abstract and paragraph [0001] through paragraph [0051] in general.] The same reasons for rejection, that apply to **claims 1, 2, 3** also apply to **claim 4** and need not be reiterated.

22. With respect to **Claim 5**, **Zhang** teaches and shows that "at least one set of reference MR data includes non-phase encoded data." (i.e. the non phase-encoded data acquisition sequence used to correct errors in the imaging sequence that occur with phase encoding.) [See **Zhang** figures 6a and 6b which show imaging sequences without the Ge phase encoding present, page 2 paragraph [0025] through page 4 paragraph [0051]]. The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 5** and need not be reiterated.

23. With respect to **Claim 7**, **Zhang** teaches "at two sets of reference data" because **Zhang** acquires reference data without phase encoding that is split into two separate lines of data (i.e. one for odd echoes and a second line for even echoes) [See **Zhang** page 3 paragraph [0038] through page 4 paragraph [0051]] and "further comprising the steps of averaging the two sets of reference data to determine the table of correction values" [See **Zhang** page 3 paragraphs [0044] and [0045] where parameters Δ and σ are averages of the odd and even data, acquired without phase encoding. The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 7** and need not be reiterated.

24. With respect to **Claim 8**, **Zhang** teaches that "the at least one set of reference data" (i.e the non-phase encoded data resulting from the pulse sequence of figures 6a, 6b) "represents a maximum achievable signal that the acquired phase encoded MR data can attain", because **Zhang** teaches that the echo centers are measured, after the

time reversal of all even the even echoes' [See **Zhang** page 3 paragraph [0038] through page 4 paragraph [0051]] and in the absence of phase encoding. (i.e. without phase encoding) the detected amplitude at the measured center of echo the signals is hindered the least amount.] The same reasons for rejection, that apply to **claims 1, 5** also apply to **claim 2** and need not be reiterated.

25. With respect to **Claim 19**, **Zhang** teaches and/or shows "A computer readable storage medium" [See figure 1 **Zhang** page 1 paragraph [0004] "having a computer program to execute a fast Spin echo pulse sequence" (i.e. the ultra-fast EPI spin-echo sequence of figure 6a) "stored thereon and representing a set of instructions that when executed by a computer causes the computer to:" [See **Zhang** page 1 paragraph [0004] "acquire non-phase encoded MR data;" [See **Zhang** figure 6a and paragraph [0024] through [0051]] "acquire phase encoded MR data from multiple echoes;" [See figure 2] "and modify the phase encoded MR data by the non-phase encoded MR data to correct amplitude modulation" (i.e. see the correction parameters of paragraph [0038] through paragraph [0051]) "between the multiple echoes" [See figures 4 through 7b in combination].

26. With respect to **Claim 23**, **Zhang** teaches and/or shows "generating a set of amplitude correction values from the non-phase encoded MR data;" [See **Zhang** paragraphs [0024] through [0051] "arrange the set of amplitude correction values in a table dimensionally equivalent to a k-space of phase encoded MR data;" [See **Zhang** figures 4 through 7b in combination with paragraphs [0001] through [0023] and "modify each data point of k-space with a similarly positioned amplitude correction value". [See **Zhang** paragraphs [0024] through [0051] figures 4 through 7b]. The same reasons for rejection, that apply to **claim 19** also apply to **claim 23** and need not be reiterated.

27. With respect to **Claim 24**, **Zhang** teaches and/or shows "amplitude correcting acquired phased encoded MR data without increasing scan time". [See **Zhang** page 4 paragraphs [0049] through [0051]] The same reasons for rejection, that apply to **claim 19** also apply to **claim 24** and need not be reiterated.

28. With respect to **Claim 25**, **Zhang** teaches and/or shows "carrying out a pre-scan of a subject" 9i.e. initially paragraph [0006]) "and acquire the non-phase encoded MR

data after the pre-scan" (i.e. after the initial guess of paragraph [0006]) "but before acquisition of the phase encoded MR data. [See **Zhang** paragraphs [0006] and paragraphs [0024] through [0051] The same reasons for rejection, that apply to **claim 19** also apply to **claim 25** and need not be reiterated.

29. With respect to **Claim 26**, **Zhang** shows from the connection lines which connect the components of figure 1 that the "computer data signal" is "embodied in a carrier wave that is uploadable/downloadable to an MR imaging system." [See **Zhang** figure 1, paragraphs [0003] through [0009]] The same reasons for rejection, that apply to **claim 19** also apply to **claim 26** and need not be reiterated.

30. **Claims 11-14, and 16-18** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Maier et al.,** US patent 5451876 issued September 19th 1995. This patent has an equivalent in German (i.e. DE 4436801 A1 published 20th April 1995).

31. With respect to **Claim 11**, **Maier et al**., teaches and shows "An MRI apparatus comprising: a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images", [See **Maier et al**., figure 1, col. 1 line 1 through the entire detailed description] "and a computer" (i.e. computer system 107) "programmed to: (A) acquire at least one set of reference MR data;" (i.e. the MR data without phase encoding) "(B) determine a table of amplitude modulation correction values from the reference MR data; (C) acquire MR data; and (D) modify the acquired set of reference MR data by the table of amplitude modulation correction values". [See **Maier et al**., col. 1 line 1 through the entire detailed description. The examiner notes that constructing a table of amplitude correction values is a main point of the entire reference.]

32. With respect to **Claim 12**, **Maier et al**., teaches "acquiring the at least one set of reference MR data from one or more discarded acquisitions played out one of prior to and after acquisition of the MR data". [See **Maier et al**., detailed description paragraph 20 "Referring particularly to figure 4 ..." through the end of the detailed description] The

same reasons for rejection, that apply to claim **11** also apply to **claim 12** and need not be reiterated.

33. With respect to **Claim 13**, **Maier et al**., teaches "acquiring portions of the at least one set of reference MR data prior to and after acquisition of the MR data. ". [See **Maier et al**., detailed description paragraph 20 "Referring particularly to figure 4 ..." through the end of the detailed description] The same reasons for rejection, that apply to claim **11** also apply to **claim 13** and need not be reiterated.

34. With respect to **Claim 14**, **Maier et al**., teaches that "the at least one set of reference MR data includes non-phase encoded data" [See **Maier et al**., detailed description paragraph 22 "The table of receiver attenuation values (RA used during the scan can be produced in a number of ways ..." through the end of the detailed description] **Maier et al**., teaches that "the MR acquired MR data is modified while in k-space" because the amplitude correction occurs prior to the Fourier Transformation which produces the final resulting image(s). [See the entire **Maier et al**., detailed description.] The examiner notes that any step which occurs prior to the image producing Fourier Transform occurs necessarily in the intrinsic k-space domain. The same reasons for rejection, that apply to claim **11** also apply to **claim 14** and need not be reiterated.

35. 16. With respect to **Claim 16**, **Maier et al**., teaches that "the RF coil assembly includes a phased array" (i.e. a plurality) "of receiver coils" [See **Maier et al**., detailed description paragraph 19 which starts with the text "It should be apparent to those skilled in the art that when a plurality of receivers ... as with phase array receive coil. ..."] . The same reasons for rejection, that apply to claim **11** also apply to **claim 16** and need not be reiterated.

36. With respect to **Claim 17**, **Maier et al**., teaches that "the computer is further programmed to carry out acts (A)-(D) independently for each receiver coil" [See **Maier et al**., detailed description paragraph 7 which starts with the text "Referring particularly to figures 1 and 2, ... the coils 152A, 152B may be separate as shown in fig. 2, ..." and detailed description paragraph 19 that begins with "It should be apparent to those skilled in the art that when a plurality of receivers ... as with phase array receive coil. ..."

through the end of the detailed description]. The same reasons for rejection, that apply to **claims 11, 16** also apply to **claim 17** and need not be reiterated.

37. With respect to **Claim 18**, **Maier et al.**, teaches generating "an image space from the modified MR data." [See **Maier et al.**, detailed description paragraph 10 which starts with the text "The received signal ..." detailed description paragraph 20 which starts with the text "Referring particularly to figure 4 ..." and detailed description paragraph 21 which starts with the text "After the prescan 230, and ..."]. The same reasons for rejection, that apply to claim **11** also apply to **claim 18** and need not be reiterated.

Claim Rejections - 35 USC § 103

38. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

39. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

40. **Claims 1, 9, 10** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Maier et al.,** US patent 5451876 issued September 19th 1995; (i.e. applicant note that his patent also has an equivalent in German (i.e. DE 4436801 A1 published 20th April 1995)) and further in view of **Zhang** US patent application publication 2003/0109781 A1 published June 12th 2003, filed December 11th 2001.

41. With respect to **Claim 1**, **Maier et al.,** teaches and shows "A method comprising the steps of: acquiring MR data from multiple echoes in an echo train with a pulse sequence;" [See **Maier et al.**, detailed description paragraph 5 which starts with the text

"a transceiver module 150 ...] Maier **et al.,** also teaches and shows "correcting for amplitude modulation effects in the pulse sequence after data acquisition" [See **Maier et al.,** the three paragraphs under the "summary of the invention" and the entire detailed description.] **Maier et al**., lacks directly teaching the use of "a fast spin echo pulse sequence." However, **Zhang** shows in figures 2,and 6a an EPI sequence using spin echoes, which is "a fast spin echo pulse sequence." Additionally **Zhang** teaches in paragraph [0007] that an EPI sequence is used as a pulse sequence in ultra-fast magnetic resonance imaging. The examiner also notes that the **Zhang** apparatus uses more than 1 reception coil, [See **Zhang** figure 1, and page 1 paragraph [0004]] Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Maier et al**., which corrects the amplitude modulations of a plurality of signals from one or a plurality of independent receiver coils, with the teaching of **Zhang** when it is desirous to image and correct amplitude rapidly because correcting each echo individually increases scanning time which is undesirable in fast imaging situations such as cardiac imaging, or imaging conducted while a patient is holding his or her breath.

42. With respect to **Claim 9**, " **Maier et al**., teaches that "the MR data is acquired via multiple receiver coils, (i.e. a plurality) "of receiver coils" [See **Maier et al**., detailed description paragraph 19 which starts with the text "It should be apparent to those skilled in the art that when a plurality of receivers ..."] "and further comprising the steps of correcting for amplitude modulation effects in the MR data from each receiver coil independently." [See the **Maier et al**., detailed description paragraph 19 which starts with the text "It should be apparent to those skilled in the art that when a plurality of receivers ..." through the end of the detailed description.] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 9** and need not be reiterated.

43. With respect to **Claim 10**, **Maier et al**., teaches "generating a combined image from corrected image data from each receiver coil." [See **Maier et al**., detailed description paragraph 10 which starts with the text "The received signal ..." detailed description paragraph 20 which starts with the text "Referring particularly to figure 4 ..."

and detailed description paragraph 21 which starts with the text "After the prescan 230, and ..." See also the **Maier et al**., abstract where all the received corrected signals are used to reconstruct an image, and **Maier et al**., detailed description paragraph 19 which starts with the text "It should be apparent to those skilled in the art that when a plurality of receivers ..." through paragraph 21 where a single image or a plurality of images may be formed]. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9** also apply to **claim 10** and need not be reiterated.

44. With respect to **Claim 15**, **Maier et al**., lacks directly teaching that "the computer is further programmed to acquire the MR data with a fast spin echo pulse sequence." However, as mentioned with respect to **claim 1** above, **Zhang** shows in figures 2,and 6a an EPI sequence using spin echoes, which is "a fast spin echo pulse sequence." Additionally **Zhang** teaches in paragraph [0007] that an EPI sequence is used as a pulse sequence in ultra-fast magnetic resonance imaging. The examiner also notes that the **Zhang** apparatus uses more than 1 reception coil, [See **Zhang** figure 1, and page 1 paragraph [0004]] Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Maier et al**., which corrects the amplitude modulations of a plurality of signals from one or a plurality of independent receiver coils, with the teaching of **Zhang** when it is desirous to image and correct amplitude rapidly because correcting each echo individually increases scanning time which is undesirable in fast imaging situations such as cardiac imaging, or imaging conducted while a patient is holding his or her breath. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 15** and need not be reiterated.

45. The **prior art made of record** and not relied upon (i.e. See the attached PTO 892) is considered pertinent to applicant's disclosure.

46. Applicant please note the numerous references listed on the Notice of References Cited which is attached to this office action.

Conclusion

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-

2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

48. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(703) 872-9306**.

TAF
March 6, 2005

for Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800